1896MNRAS..57...26T

Observations of Phenomena of Jupiter's Satellites at Windsor, New South Wales, in the Year 1896. By John Tebbutt.

Day of Obs.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	G.M.T. of Observation.			Mean Time of *N. Almanac.*		
1896.						h	m	s	h	m	s
Jan. 22	II.	Occ. D.	First contact	4½ in.	120	23	44	31			
22	II.	Ecl. D.	Last seen	,,	,,	23	47	11	23	46	36
26	I.	Tr. Ingr.	Ext. contact	8 in.	138	23	58	5			
27	I.	,,	Bisection	,,	,,	0	0	30			
27	I.	,,	Int. contact	,,	,,	0	2	24			
27	I.	Ecl. R.	First seen	4½ in.	120	23	29	57	23	29	33
Feb. 3	I.	Occ. D.	First contact	,,	,,	22	47	52			
3	I.	,,	Bisection	,,	,,	22	50	21	22	50	
3	I.	,,	Last seen	,,	,,	22	52	21			
4	I.	Ecl. R.	First seen	8 in.	90	1	23	50	1	24	
4	I.	,,	Full brightness	,,	,,	1	26	35			
18	I.	Tr. Ingr.	Ext. contact	,,	300	23	39	2			
18	I.	,,	Bisection	,,	,,	23	40	41	23	39	
18	I.	,,	Int. contact	,,	,,	23	42	31			
19	I.	Ecl. R.	First seen	,,	138	23	41	48	23	42	7
19	I.	,,	Full brightness	,,	,,	23	46	3			
26	I.	Occ. D.	First contact	,,	,,	22	31	25			
26	I.	,,	Bisection	,,	,,	22	33	15	22	32	
26	I.	,,	Last seen	,,	,,	22	34	30			
26	III.	Ecl. R.	First seen	,,	,,	23	41	4	23	41	46
26	III.	,,	Full brightness	,,	,,	23	46	28			
27	I.	,,	First seen	,,	,,	1	36	52	1	37	3
27	I.	,,	Full brightness	,,	,,	1	40	9			
Mar. 3	II.	Tr. Egr.	Bisection	4½ in.	120	21	17	7	21	21	
3	II.	,,	Ext. contact	,,	,,	21	20	32			
4	III.	Occ. D.	First contact	,,	...	20	22	28			
4	III.	,,	Bisection	,,	...	20	25	57	20	26	
4	III.	,,	Last seen	,,	...	20	28	47			
5	III.	Occ. R.	First seen	8 in.	138	0	0	2			
5	III.	,,	Bisection	,,	,,	0	1	17	0	5	
5	III.	,,	Last contact	,,	,,	0	2	47			
5	III.	Ecl. D.	Last seen	,,	,,	0	11	18	0	10	39

1896MNRAS..57...26T

Day of Obs.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	G.M.T. of Observation.			Mean Time of *N. Almanac.*		
1896.						h	m	s	h	m	s
Mar. 5	I.	Occ. D.	First contact	8 in.	230	0	17	50			
5	I.	,,	Bisection	,,	,,	0	19	44	0	19	
5	I.	,,	Last seen	,,	,,	0	21	20			
5	I.	Tr. Ingr.	Ext. contact	,,	138	21	40	2			
5	I.	,,	Bisection	,,	,,	21	42	2	21	38	
5	I.	,,	Int. contact	,,	,,	21	43	21			
5	I.	Tr. Egr.	Int. contact	,,	,,	23	54	55			
5	I.	,,	Bisection	,,	,,	23	56	59	23	58	
5	I.	,,	Ext. contact	,,	,,	23	59	24			
6	I.	Ecl. R.	First seen	,,	74	22	0	31	22	0	50
6	I.	,,	Full brightness	,,	,,	22	4	15			
10	II.	Tr. Egr.	Bisection	,,	,,	23	41	4	23	44	
10	II.	,,	Ext. contact	,,	,,	23	43	48			
11	IV.	Ecl. R.	First seen	,,	,,	0	23	58	0	27	44
11	IV.	,,	Full brightness	,,	,,	0	31	55			
15	III.	Shd. Egr.	Int. contact	,,	168	21	40	56			
15	III.	,,	Half off	,,	,,	21	46	0	21	53	
15	III.	,,	Last seen	,,	,,	21	48	29			
19	II.	Ecl. R.	First seen	,,	112	23	20	11	23	20	21
19	II.	,,	Full brightness	,,	,,	23	23	53			
20	I.	Tr. Ingr.	Ext. contact	,,	168	1	17	14			
20	I.	,,	Bisection	,,	,,	1	18	59	1	17	
20	I.	,,	Int. contact	,,	,,	1	21	29			
20	I.	Occ. D.	First contact	,,	,,	22	22	34			
20	I.	,,	Bisection	,,	,,	22	24	36	22	26	
20	I.	,,	Last seen	,,	,,	22	27	0			
22	III.	Tr. Egr.	Int. contact	,,	,,	21	5	19			
22	III.	,,	Bisection	,,	,,	21	7	39	21	13	
22	III.	,,	Ext. contact	,,	,,	21	12	13			
Apr. 5	I.	Occ. D.	First contact	,,	,,	20	34	52			
5	I.	,,	Bisection	,,	,,	20	37	26	20	38	
9	III.	Ecl. D.	Began to fade	,,	74	20	5	25			
9	III.	,,	Last seen	,,	,,	20	10	58	20	9	8
12	I.	Occ. D.	First contact	,,	168	22	28	12			
12	I.	,,	Bisection	,,	,,	22	31	37	22	32	
12	I.	,,	Last seen	,,	,,	22	32	57			
13	II.	Ecl. R.	First seen	,,	,,	20	22	40	20	23	3

1896MNRAS..57...26T

Day of Obs.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	G.M.T. of Observation.			Mean Time of *N. Almanac.*		
1896.						h	m	s	h	m	s
Apr. 13	II.	Ecl.R.	Full brightness	8 in.	168	20	26	56			
13	I.	Shd. Ingr.	First contact	,,	,,	21	4	20			
13	I.	,,	Half on	,,	,,	21	6	50	21	6	
13	I.	,,	Int. contact	,,	,,	21	8	29			
13	I.	Tr. Egr.	Int. contact	,,	,,	22	5	15			
13	I.	,,	Bisection	,,	,,	22	8	9	22	9	
13	I.	,,	Ext. contact	,,	,,	22	10	49			
14	I.	Ecl. R.	First seen	,,	,,	20	35	6	20	35	13
14	I.	,,	Full brightness	,,	,,	20	37	54			
16	III.	Occ. R.	Last contact	,,	,,	22	28	51	22	33	
18	II.	Tr. Ingr.	Int. contact	,,	,,	22	44	45	22	43	
21	I.	Ecl. R.	First seen	,,	74	22	30	33	22	30	42
21	I.	,,	Full brightness	,,	,,	22	33	9			
28	I.	Occ. D.	First contact	,,	300	20	49	19			
28	I.	,,	Bisection	,,	,,	20	51	34	20	52	
28	I.	,,	Last seen	,,	,,	20	52	49			
29	I.	Tr. Egr.	Bisection	,,	138	20	27	3	20	28	
29	I.	,,	Ext. contact	,,	230	20	29	53			
May 6	I.	,,	Int. contact	,,	168	22	20	44			
6	I.	,,	Bisection	,,	,,	22	23	54	22	24	
6	I.	,,	Ext. contact	,,	,,	22	25	48			
7	I.	Ecl. R.	First seen	,,	,,	20	50	25	20	50	32
7	I.	,,	Full brightness	,,	,,	20	53	53			
11	III.	Tr. Ingr.	Ext. contact	,,	132	21	11	6			
11	III.	,,	Bisection	,,	,,	21	14	21	21	14	
11	III.	,,	Int. contact	,,	,,	21	18	15			
16	IV.	Ecl. D.	Began to fade	,,	168	19	59	54			
16	IV.	,,	Last seen	,,	,,	20	7	10	20	3	53
29	III.	Occ. D.	First contact	,,	,,	19	41	52			
29	III.	,,	Bisection	,,	,,	19	46	11	19	46	
29	III.	,,	Last seen	,,	,,	19	48	26			
29	II.	,,	First contact	,,	,,	20	8	23			
29	II.	,,	Bisection	,,	,,	20	10	12	20	10	
29	II.	,,	Last seen	,,	,,	20	12	17			
29	I.	Tr. Ingr.	Ext. contact	,,	,,	20	28	14			
29	I.	,,	Bisection	,,	,,	20	30	59	20	28	
29	I.	,,	Int. contact	,,	,,	20	33	23			

1896MNRAS..57...26T

In addition to the preceding observations the following times were noted, when the centres of certain objects were on the central meridian of the planet :—

Day of Obs. 1896		Object.			Aperture of Telescope.	Mag. Power.	G.M.T.		
							h	m	s
Mar.	3	Shadow of Satellite		II.	4½ in.	120	21	34	15
	5	,,	,,	I.	8 in.	138	23	39	17
	11	,,	,,	II.	,,	168	0	4	15
	29	Satellite III.			..	,,	23	9	32
Apr.	13	Shadow of Satellite		I.	,,	,,	22	9	18
	29	,,	,,	I.	..	138	20	25	4
May	6	,,	,,	I.	,,	168	21	20	14
	24	Satellite IV.			,,	,,	20	4	1

Notes.

January 22.—Sky brilliantly clear, but Moon present; the satellite began to fade in eclipse when in contact with the limb.

January 26 and 27.—Images steady and definition pretty good for the transit ingress. Sky clear, but bright Moon and images tremulous and badly defined at the eclipse. The satellite was suspected 9·5 seconds earlier, and came out very close to the limb.

February 3.—Images steady and pretty well defined.

February 4.—Sky beautifully clear and definition excellent. When first seen the satellites are usually copper-coloured specks but on this occasion the satellite was first seen as a minute silvery speck close to the limb.

February 18.—Definition pretty good.

February 19.—Sky clear, but images slightly boiling.

February 26.—Images tremulous and not well defined at the occultation. Sky clear and images pretty well defined at the eclipse. The Moon was not far from the planet, and the time of first seeing is considered rather late.

February 27.—Sky beautifully clear, but Moon present.

March 3.—Planet boiling at internal contact; definition better at the other phases. The transit of the shadow of II. across the central meridian was estimated.

March 4.—Observation immediately after sunset.

March 5.—Sky clear and steadiness and definition pretty satisfactory at the occultation reappearance and eclipse disappearance. The satellite was very small at reappearance from occultation and immediately began to fade in eclipse. It was suspected 8 seconds after the recorded time of last seen. Steadiness and definition satisfactory at the occultation disappearance, and pretty satisfactory at the transit ingress At the meridian transit of the shadow of I. and the transit egress of I. these conditions greatly improved. The transit of the shadow of I. was estimated.

March 6.—Sky clear and objects pretty steady and well defined.

March 10.—Good definition.

March 11.—The transit of the shadow of II. was observed by means of the micrometer threads. Sky very clear and definition good at the eclipse reappearance; the satellite came out close to another.

March 15.—Good definition.

March 19.—Planet occasionally dimmed by light clouds, but it shone bright and clear at the critical time. The satellite came out close to the first.

March 20.—Images tremulous and badly defined at the transit ingress, more particularly at the internal contact. The definition for the first two phases of the occultation disappearance was pretty good, but not for the last.

1896MNRAS..57...26T

March 22.—Images steady and well defined and observations pretty good.

March 29.—The transit of III. over the central meridian was observed by means of the micrometer threads. The satellite was seen as a dark spot. A dark spot on the planet itself was observed to cross the meridian eight minutes later, and of the two objects the satellite was the darker.

April 5.—Definition not good and images tremulous.

April 9.—Beautifully clear, but twilight pretty strong. The time of beginning to fade was unusually well observed by comparison with another satellite.

April 12.—Definition not good, and last phase very difficult of observation.

April 13.—Sky clear, but definition not good. Satellite II. was suspected five seconds earlier than the recorded time. The transit of the shadow of I. across the central meridian was determined by estimation only.

April 14.—Sky beautifully clear and definition pretty good.

April 16.—Sky beautifully clear and definition pretty good; observation pretty accurate.

April 18.—Definition remarkably good.

April 21.—Sky beautifully clear, but images tremulous and ill-defined. The satellite was suspected four seconds before the recorded time.

April 28.—Good definition, except at final disappearance, when the limb was disturbed.

April 29.—The transit of the shadow was observed by means of the micrometer threads.

May 6.—The transit of the shadow was observed by estimation only. The definition was very bad at the transit of I., and the observations are therefore very unsatisfactory.

May 7.—Sky clear and steadiness and definition pretty satisfactory. The satellite was suspected ten seconds earlier than the recorded time.

May 11.—Images very tremulous and ill-defined and the times very unsatisfactory.

May 16.—Satellite suspected to be fading $1^{m}\ 20^{s}$ earlier than the recorded time. Sky beautifully clear, but twilight had scarcely disappeared. Images steady and well defined and observation of final disappearance good.

May 24.—The satellite was watched at intervals from $19^{h}\ 22^{m}$ to $21^{h}\ 23^{m}$ and found to be perfectly black—as black, indeed, as I have ever seen a shadow of a satellite. Neither the ingress nor the egress could be observed, and the transit across the central meridian was determined by estimation. The satellite differed in its appearance from the shadows in that it seemed to be in space between the observer and the surface of the planet.

May 29.—Bad definition throughout.

An occulting bar was not employed in the eclipse observations. The times given are the Windsor mean times of observation diminished by $10^{h}\ 3^{m}\ 20^{s}$ and entered to the nearest second. The observations of full brightness in the eclipses are at the best only roughly approximate. In determining these times the increasing light of the satellite was repeatedly compared with the other visible satellites.

Private Observatory, Windsor, N.S. Wales:
1896 *September* 5.